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Annualized versus non-annualized lifetime income redistribution

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This paper concerns the impact of the lifespan on the redistributive effect of the social security system when considering lifetime income. It is shown that with the exception of the old age pensions, the impact is very small. It is also doubted whether annualization has to be applied.

1. INTRODUCTION

The length of the lifespan of course affects the redistributive impact of the social security system. One issue in discussing lifetime income inequality therefore is the question whether differences in life duration have to be taken into account. An illustration of the problem has been shown clearly by Harding (1993). She presents two persons, Harry who lives 50 years and Jenny who reaches the age of 90. Their gross lifetime income amounts to \$800 000 and \$1 000 000, respectively, whereas they receive a cash transfer of \$50 000 and \$90 000 respectively. This implies that cash transfers form 6.25% of Harry's gross lifetime income and 9.0% of Jenny's gross lifetime income. So, the rich person (Jenny) receives a higher proportion of cash income than the poor person (Harry) and the transfer system appears to be regressive. On the other hand, if we take account of the length of life and look at the amounts received per year of life,[1] we see that gross lifetime income amounts to \$16 000 for Harry and \$11 111 for Jenny, whereas the cash transfers are \$1000 for both. As a percentage of lifetime income, the cash transfers again amount to 6.25 and 9.0%, respectively. Now, the poor person – now Jenny – receives proportionally more than the rich person, now Harry. So, the transfer system appears to be progressive over lifetime. In other words: '(I)t is critical to take into account the time period over which income is received if people within the model have different lifespans' (Harding, 1993, p. 47).

Harding uses the number of adult years a person lives. Using equivalent household income, as in Nelissen (1994), it is more convenient to divide by the number of years lived. However, how to deal with schemes, which only give a benefit during a certain period of life? For example, the Dutch public old age pension gives (almost) everyone a flat-rated benefit. Do we have to divide by the number of (adult) years lived, or by the number of years lived after the age of 65, the age at which persons are eligible for that benefit? But is it rational to take account of differences in life duration, if one realizes that the (average) life expectancy is negatively correlated with economic status and/or income? From studies it appears that differences between low-income and high-income groups can amount to six to eight years for men and about four years for women in favour of the latter group; see e.g. Desplanques (1984), Koskinen (1985) and Bebington (1993). It seems to me that in this case it is expedient not to correct for (differences in) life duration. How to deal with child allowances? Have we to adjust the (annualized) benefit, if a child dies before it reaches the age when no child allowances are received? The matter is not so unequivocal as Harding suggests. But on the other hand it is also reasonable to criticize the approach that does not take differences in life duration into account.

However, it is not known to what different results the two approachs lead. Therefore, we look at the results for two extreme situations: (1) the situation in which all amounts are annualized, which means that the resulting amounts are divided by the number of years lived; and (2) the situation in which the amounts are not adjusted. The latter is described as non-annualized.

We compared the redistributive impact of the social security system in the Netherlands using annualized and non-annualized amounts. In view of the problem definition, the Netherlands has the advantage that its social security system contains a large variety of social security schemes. These schemes are

[1] In contrast with Harding (1993) we use the numbers of years a person lived instead of the numbers of years of adult life. The latter has been defined as the former minus fifteen.

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described in Section II. The analysis has been carried out by means of the NEDYMAS microsimulation model; for an extensive description, see Nelissen (1994). The results are shown in Section III, while Section IV concludes.

II. THE DUTCH SOCIAL SECURITY SYSTEM

The current definition of social security in its broad sense in the Netherlands considers social security as the totality of legal measures which are aimed at guaranteeing continuity in the spending opportunities. On the basis of this definition, we can divide social security into four components: (1) social insurances; (2) occupational pensions; (3) social assistance and (4) direct payments by the employer. Social insurances are all legal arrangements which are primarily aimed at *income redistribution* between persons or social groups, whereby the right to a benefit is based on the insurance concept. Voluntary insurances, for which participation depends on legalized entry requirements, are also considered as social insurances. In the Netherlands the social insurances are characterized by a dualistic system, namely a combination of a flat-rated (but not means tested) minimum system covering the whole population (called general insurance) and a wage-related system for employees (called employee insurance). In both cases contributions depend on the income and have to be paid up to a ceiling. The first one starts from the solidarity principle, whereas the latter has the equivalence or insurance principle as its starting point. Both are financed by the pay-as-you-go system. These two types of social insurances cover about 40% and 30%, respectively, of total social security expenditures in the Netherlands. The general insurances include the old-age state pension (AOW), the widow state pension (AWW), the disability state pension (AAW), the family allowances (AKW) and the state provision for health costs (AWBZ). The net pensions for a family, a one-parent family and a single person amount to 100, 90 and 70%, respectively, of the net minimum wage (about Dfl.23 070 or US$12 800 in 1994). The employee insurances are the sickness benefit (ZW), the disability benefit (WAO), the unemployment benefit (WW) and (up to a certain income limit) the health care costs provision for employees (ZFW). Here, the gross benefit for the ZW, WAO and WW amounts to 70% of the last earned income, up to a maximum of Dfl.74 360 or US$41 300 in 1994.

Occupational pensions include all arrangements which primarily are aimed at the redistribution of the income of persons over time. They are based on a labour relation. These pension insurances are financed by a capital reserve system. So a relationship is created between the insured person and the pension fund. The insured person has a personal claim on the pension fund, so to speak. In contrast, the old age state pension (AOW) has not been based on a labour relations and is financed by the pay as you go system. Contributions for occupational pensions generally depend on income. The benefits are mostly related to the last earned wage income and are supplementary to the old age state pension. The occupational pensions cover about 12% of total social security expenditures. Social assistance schemes include all arrangements in the field of social security, where the (means-tested) benefits are financed directly by the state. No specific premiums are levied: these provisions are financed by public funds. The General Social Assistance Act (ABW) forms the most important social assistance scheme. Its maximum benefits equal those for the general insurances. The social assistance schemes also cover about 12% of total social security expenditures. Direct payments by the employer refer to payments to (former) employees on the basis of a labour relation. It mainly concerns benefits towards (former) public servants. The benefits are wage related, with the exception of the child allowances. No contributions are levied. The benefits are also financed via public funding. They form about 5% of the social security expenditures. We will not comment on this category, because of the small amounts involved.

III. RESULTS

The income components have been adjusted for the household composition (via the equivalence scale) and the resulting amounts have been adjusted for changes in the price index and discounted to 1990, using a discount rate of 4%, which is about the real interest rate in the Netherlands during the last century. Therefore, the net benefit can be considered as the real gain from the system or, in the terminology of Burkhauser and Warlick (1981), as the transfer component of the scheme(s) under consideration. Moreover, persons who were involved in migration have been excluded from our calculations. The calculations are based on 10 runs with a different set of random numbers, all starting with a micro database of 10 000 persons in the year 1947. The simulation runs to the year 2060. Thus the birth generations 1930 up to 1960 can be followed almost completely, with respect to their socio-economic life history.[2] The redistributive impact has been measured via comparison with the gross wages, because no data exist to simulate a world in which government is absent. Further, it is assumed that the burden of benefits (contributions) is fully incident upon the person who receives (pays) the benefit (contribution). This follows standard practice in major

[2] In 2060 only 0.8% of the persons born in the year 1960 and about 5% of those born in 1965, will still be alive. No account has been taken of income and contributions after 2060. The average number of persons per run, involved in the simulation, amounts to 923 for cohort 1930, 1667 for cohort 1940, 2297 for cohort 1950 and 2363 for cohort 1960. Because 10 runs have been used, this implies e.g. for cohort 1930, that the calculations are based on about 9200 individual life histories.

incidence studies; see Reynolds and Smolensky (1977) and Central Statistical Office (1990).

Table 1 shows the Theil coefficient for gross wages and gross wages plus net social security benefits (the before-tax income) for both the annualized and non-annualized figures. The table shows that annualizing incomes affects the distribution of the gross wages to an only limited extent. But its impact on the distribution of before-tax income is considerably larger. The annualized distribution is much more equal. As a consequence, annualization results in a larger redistributive impact of the social security system in comparison with the unadjusted figures. For example, the social security system results in a lowering of the Theil coefficient (and therefore, a decrease in income inequality) by 24% for cohort 1950 if we use the anualized figures, whereas it is only 18% when using the non-annualized amounts. The effect of annualization on the redistributive impact of the social security system for the other cohorts is comparable.

In order to determine the schemes which are responsible for this difference, we look at the redistributive impact of the various schemes in Table 2 and Table 3. Table 2 reports the effect of the benefits and contributions, whereas Table 3 considers the net impact.

The redistributive effect of a scheme has been measured via a comparison with the before-tax income. For example, the impact of the annualized AOW benefit for cohort 1930 in Table 2, being −17.7%, equals the percentage difference between the Theil coefficient for the gross-wage income plus the AOW benefits and the Theil coefficient for the gross-wage income. The former amounts to 0.1441 and the latter to 0.1750. So, we get (0.1441 − 0.1750) / 0.1750 = −17.%. Thus, inclusion of the AOW benefits will decrease the Theil coefficient by 17.7%.

Looking at the redistributive impact of the various benefits for both the annualized and non-annualized figures, we find that for most schemes only a limited difference exists between both approaches. At all events, the annualized benefits have not a smaller redistributive impact. However, only the old-age state pension (AOW) and the occupational pensions show a difference, which exceeds 1 percentage point. Besides, the disability state pension (AAW) and the social assistance scheme (ABW) show a difference of 0.7 percentage points for the 1950 cohort. The annualization of course affects old age pensions in particular. For persons reaching at least the age of 65, annualization diminishes the differences in received pensions due to different ages of dying. For the other schemes it holds that differences in the redistributive impact are the result of the possibility of dying before a person reaches the age of 65. Due to the small probabilities, the effect is minor. The effect can only be of importance, if there exists a relationship between the probability of receiving a benefit and the probability of dying. This holds to some extent for the ABW. Unmarried persons call on the ABW to a larger extent than married persons do, and their probability of dying is also larger. This explains the larger difference in redistributive

Table 1. *Theil coefficient for gross wages and before-tax income: annualized (A) and non-annualized (NA)*

Cohort	Gross wages		Before-tax income	
	A	NA	A	NA
1930	0.175	0.178	0.121	0.134
1940	0.148	0.148	0.095	0.108
1950	0.115	0.125	0.087	0.103

Table 2. *Redistributive impact of benefits and contributions: annualized (A) versus non-annualized (NA): cohort 1930 and 1950*

Cohort	1930		1950	
Benefits	A	NA	A	NA
AOW	−17.7	−14.9	−9.5	−7.1
AWW	−3.1	−3.0	−2.0	−1.8
AAW	−9.9	−9.6	−8.3	−7.6
AKW	−1.8	−1.7	−2.5	−2.3
General insurances	−28.4	−25.2	−20.1	−16.8
ZW	−3.1	−3.1	−3.8	−3.5
WW	−1.0	−1.0	−1.1	−1.0
WAO	−5.5	−5.2	−4.7	−4.4
Employee insurances	−10.9	−10.5	−10.5	−9.5
ABW	−8.6	−8.4	−9.0	−8.3
Occupational pensions	+2.5	+3.6	+2.2	+3.6
All benefits	−37.6	−33.7	−31.3	−26.5
	+6.4	+6.3	+7.6	+7.0
Contributions				
AOW				
AWW	+0.8	+0.8	+0.9	+0.8
AAW	+0.7	+0.7	+1.6	+1.5
AKW	+0.6	+0.6	+0.4	+0.4
AWBZ	+1.8	+1.7	+2.7	+2.5
General insurances	+12.2	+12.0	+15.7	+14.7
ZW	+1.8	+1.8	+2.0	+1.9
WW	+0.5	+0.5	+0.6	+0.5
WAO	+0.7	+0.7	+0.9	+0.9
ZFW	+3.4	+3.4	+4.0	+3.8
Employee insurances	+7.5	+7.3	+8.8	+8.2
Occupational pensions	−0.6	−0.7	−0.6	+1.3
All contributions	+20.5	+20.1	+28.0	+26.1

Table 3. *Annualized (A) versus non-annualized (NA) net benefits: cohort 1930 and 1950*

Cohort	1930		1950	
Net Benefits	A	NA	A	NA
AOW	−13.5	−10.7	−3.4	−1.3
AWW	−2.4	−2.3	−1.1	−1.0
AAW	−9.4	−9.2	−7.1	−6.5
AKW	−1.2	−1.1	−2.1	−1.9
General insurances	−23.0	−19.8	−11.0	−8.1
ZW	−1.5	−1.5	−2.0	−1.9
WW	−0.6	−0.6	−0.6	−0.5
WAO	−4.9	−4.7	−4.0	−3.7
Employee insurances	−5.2	−4.9	−4.0	−3.4
General + employee insurance	−24.7	−21.3	−12.6	−9.5
Occupational pensions	+1.9	+2.9	+1.4	+4.6
All benefits	−29.7	−24.8	−22.6	−17.7

impact for the ABW. The smaller impact for the older cohort is caused by the fact that members of this generation made less use of the ABW. The ABW has been introduced in 1965 and the calls on it rose in particular at the beginning of the 1980s. However, these were especially young people, as a large part of the older generation could claim other (more generous) benefits in this period of increasing unemployment. As the probability of becoming sick, disabled or widowed increases by age, schemes concerned show a slightly larger redistributive impact under the annualized regime. Having children is in some way also related to age, but to a lesser extent than other events. This explains the somewhat smaller difference for the family allowance (AKW).

As the contributions are generally regressive (see Nelissen, 1994), the annualization results in a larger income inequality-increasing impact for the contributions. There is one exception, being the occupational pension contributions for the 1950 cohort. The cause for this is that as a consequence of the annualization the proportion of the contributions as a percentage of gross wages changes rather strongly in the lower deciles (also due to a reclassification of individuals) for the occupational pensions, whereas this hardly occurs for other schemes. This results in a more income-equalizing impact of the occupational pensions.

All in all, the benefits result in a larger redistributive impact of the social security system if we annualize the amounts involved, whereas contributions increase income inequality, but to a smaller extent then benefits diminish it. This is confirmed by Table 3, where the net impact of the various schemes has been shown. Looking at all schemes together, we find that annualization results for both cohorts in a 5 percentage-points larger redistributive impact.[3]

IV. DISCUSSION

The foregoing shows that for most schemes the application of annualization hardly affects the redistributive impact. However, this does not hold for old age pensions. Both the flat-rated old age state pensions (AOW) and the earnings-related occupational pensions have a larger income inequality-decreasing effect if the amounts concerned have been annualized. The findings do not change if we use another discount rate. As the Dutch social security system is a combination of various types (a need-based minimum system as well as an earnings-related system), the conclusion will not differ for other countries.

Whether annualization has to be applied, will remain a point of discussion. However, in our view dying is a chance mechanism comparable to the probability of becoming disabled or unemployed. In these latter cases, we also do not adjust the amounts for years of living in good health or employed status. This is in contrast to events which, for example, concern the household composition as a consequence of birth or marriage. These mostly are deliberate choices and therefore it is quite common in lifetime analysis to apply equivalent scales.

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[3] We are here concerned with the net result of AOW, AWW, AAW, AKW, ZW, WW, WAO and occupational pensions. The before-tax result in Table 1 also includes the contributions for th AWBZ and ZFW and the benefits for the ABW. However, this is not really a net result as we are not able to include medical consumption and the tax financing of the ABW.